



IAF CAAR | CONFORMITY ASSESSMENT | FIRST EDITION

TECHNICAL MANUAL

Technical competence, valid evidence, uncertainty,
witnessing and reliable automotive assessment.

PREPARED FOR IAF ADOPTION

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Document control

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Authority boundary	Voluntary sectoral assurance. No automatic public appointment, statutory authorization, external-standard equivalence or universal acceptance.
Use	Controlled ten-document set. Protect completed applications, client evidence, personal data and decision records.

Purpose and use

Technical competence, valid evidence, uncertainty, witnessing and reliable automotive assessment.

This document implements the Standard and cannot weaken its requirements. Administrative convenience, commercial priority or a favorable score cannot compensate for unproven competence, unsafe work or compromised impartiality.

Contents

Document control	2
TM01 Building an assessable capability claim	4
TM02 Method verification and validation	4
TM03 Measurement traceability and equipment assurance	5
TM04 Uncertainty and defensible conformity decisions	5
TM05 Sampling, configuration and evidence custody	6
TM06 Validity monitoring and external comparisons	7
TM07 Inspection, auditing and professional judgment	7
TM08 Certification evaluation and continuing assurance	8
TM09 Personnel competence assessment	8
TM10 Claims, validation and verification	9
TM11 Digital evidence, automation and model credibility	9
TM12 IAF file sampling and witness coverage	10
TM13 Proficiency programmes and reference materials	10
TM14 Technical closure and defensible restoration	11

TM01 Building an assessable capability claim

Start with the conclusion

Write the conclusion the service intends to support before selecting equipment or methods. Identify the object, property, population, conditions, intended users and consequence of a wrong answer. A brake measurement, a vehicle-condition inspection and certification of a brake product family are different claims with different evidence needs.

Translate the claim into a scope row and a technical family. Establish the competence, facilities, measurement resources, methods, original records and review needed at the actual site. A broad service name such as automotive testing is not an assessable capability.

Minimum technical dossier

The dossier should contain the approved work instruction; intended-use and range statement; verification or validation plan; performance results; uncertainty or limitation analysis; equipment and software versions; staff authorizations; validity controls; sample/configuration controls; report template; and three complete executed case files per family/site for ACC readiness.

Select representative and worst-case implementations. Explain why other members share the same principles and risks. Keep materially different methods separate. The independent assessor may reject grouping or require more witness work. A sample plan provides a minimum examination of evidence, not a guarantee that unobserved capability is acceptable.

Acceptance and review

Record predefined acceptance criteria, actual results, deviations and an authorized technical conclusion. Review original adverse data and unresolved limits. Approve only the demonstrated range and use. Changes in hardware, software, material, environment, site or personnel must trigger a proportionate review before new endorsed work.

TM02 Method verification and validation

Plan according to intended use

Verification asks whether an established method works adequately in this implementation. Validation asks whether a new, modified or differently applied method is fit for its intended use. Both require criteria established before data are evaluated, representative test conditions and competent review.

Choose relevant characteristics: selectivity, bias, recovery, repeatability, intermediate precision, range, resolution, detection capability, robustness, response time or classification performance. Not every characteristic applies to every method. Explain exclusions and the relationship between the chosen characteristics and the proposed conclusion.

Study design and evidence

Use reference values, known challenge items, representative matrices, independent methods and repeated runs as appropriate. Include operators, days, equipment and conditions that can materially affect performance. Avoid validating a model on data used to tune it without independent challenge. Record unsuccessful runs and changes to the protocol.

For categorical results evaluate false acceptance, false rejection and uncertain classifications with a suitable reference basis. For rare safety events, absence of observed failure in a small sample does not prove negligible risk. State confidence assumptions and sample limitations rather than implying certainty.

Release and change control

An authorized reviewer checks whether the data support the intended scope and whether limitations are visible in instructions and reporting. Store the approved version, raw data and calculations. Revalidate material changes; a supplier software update can affect results even when the instrument name is unchanged. Use targeted studies only where the unaffected parts are justified.

TM03 Measurement traceability and equipment assurance

Establish the measurement chain

Identify each significant measurement and the reference needed to support it. Link the working instrument to calibration results, reference equipment or material, competent calibration activity and an appropriate ultimate reference. Every material link must identify the result, uncertainty and relevant conditions.

A calibration certificate is useful only if it covers the required function and range with adequate uncertainty and credible competence. Check issuer, item identity, method, date, results, uncertainty, traceability and limitations. A provider logo alone is not enough. Retain the technical evaluation of the provider and certificate.

Maintain fitness between calibrations

Set intervals from stability, use, environment, transport, past failures and consequences. Use intermediate checks and trend rules to detect drift. Record adjustment and repair and verify fitness afterward. An in-house calibration programme requires competent personnel, suitable references, evaluated uncertainty and complete records.

If equipment fails a check, identify the last demonstrated valid point, quarantine affected use and evaluate prior results. Do not assume that a new successful calibration retrospectively proves all earlier work. The look-back review may require client notice, recalculation or retesting.

Alternative references

Some properties are defined by an agreed procedure or reference artifact rather than a directly realizable unit. Explain the reference, its suitability and limitations, and demonstrate consistency through appropriate comparisons. Do not describe operational comparability as a stronger traceability chain than the evidence supports.

TM04 Uncertainty and defensible conformity decisions

Build the uncertainty model

Define the measurand and a model linking inputs to the result. Estimate significant standard uncertainty components, sensitivities and correlations. For independent contributions already expressed in result units, combined standard uncertainty is the square root of the sum of their squares. Include covariance where inputs are correlated; do not force independence for convenience.

Example: independent standard contributions of 0.040, 0.030 and 0.020 units give combined uncertainty $\sqrt{0.040^2 + 0.030^2 + 0.020^2} = 0.0539$ units. With a justified coverage factor $k = 2$, expanded uncertainty is approximately 0.108 units. The coverage interpretation depends on the model, distributions and effective information; $k = 2$ is not an automatic universal probability guarantee.

Agree the decision rule

Specify the acceptance limit, whether uncertainty is considered, the guard band and the permitted outcome vocabulary before work. For a maximum allowed value L , one conservative interval rule is Pass when $y + U \leq L$; Fail when $y - U > L$; otherwise Inconclusive. This is an illustrative CAAR rule, not the only allowed rule. The contract must identify the actual chosen rule.

For $L = 10.0$, $y = 9.7$ and $U = 0.2$ gives Pass. With $y = 10.1$ and $U = 0.2$ the result is Inconclusive. With $y = 10.3$ and $U = 0.2$ it is Fail. If a binding requirement mandates a different rule, document and apply that rule, explain its implications and do not silently replace it.

Two-sided and qualitative decisions

For an allowed interval $[L, H]$, guarded acceptance requires the stated uncertainty interval to lie within both limits. Define boundary conventions explicitly. Asymmetric uncertainties or non-normal distributions require an appropriate model, not an automatic symmetric shortcut.

Where quantitative uncertainty is not meaningful, identify judgment limits, sampling limitations and evidence strength. Do not attach numerical confidence to a qualitative inspection merely to make it appear more rigorous. Review borderline conclusions independently.

TM05 Sampling, configuration and evidence custody

Sampling for a technical conclusion

Distinguish the body sample of products from IAF sampling of the body case files. A product sampling plan needs a defined population, sampling unit, selection method, size, timing, locations and intended inference. Explain variability, clustering, destructive constraints and false-acceptance risk where relevant.

A customer-selected sample normally supports a conclusion about that item. A shipment or fleet conclusion requires a justified representative design and controlled identification. Record missing units, substitutions, damaged seals and any selection controlled by interested parties.

Configuration as evidence

Link vehicle identity, model/variant, hardware, software, calibration files, accessories, load, tires, fuel or battery state and relevant environment to the work. Store the configuration manifest and any changes during evaluation. A later software version is not the same assessed configuration merely because the model name is unchanged.

For digital records retain original files, collection context, timestamps, responsible persons and integrity checks. A hash can demonstrate unchanged bytes but cannot by itself prove truthful collection, correct identity or complete coverage. Corroborate origin through controlled acquisition and independent evidence.

Retention and transfer

Record receipt, preparation, transfers, transformations, access and disposal. Define retention compatible with sample stability, safety and the ten-year technical-record requirement; physical samples may have shorter justified retention than their records. Preserve a legal hold and document any inability to retain hazardous or perishable items.

TM06 Validity monitoring and external comparisons

Design a scope-based programme

Map each technical family to suitable internal controls and external challenges. Include references, duplicates, blind items, trend analysis, peer observation or intercomparisons appropriate to the activity. High-consequence families need annual external challenge or a justified credible alternative; all other families must be covered within the four-year ACC cycle.

Evaluate provider competence and programme suitability before relying on a comparison. A comparison at an irrelevant matrix, range or difficulty does not demonstrate the claimed capability. Where no suitable programme exists, document the search and use an approved alternative with explicit limitations.

Illustrative performance calculations

A design may use $z = (x - X) / s$, where X is an assigned value and s is the predeclared performance spread. One illustrative scheme may classify absolute $z \leq 2$ as satisfactory, values above 2 but below 3 as requiring investigation, and values ≥ 3 as unsatisfactory. These boundaries must be agreed before the round and justified for its purpose.

For an independent result and reference with compatible expanded uncertainties, a design may use $En = (x - X) / \sqrt{Ux^2 + UX^2}$, with absolute $En \leq 1$ as the chosen acceptance criterion. Correlated measurements, incompatible coverage or underestimated uncertainty can invalidate this interpretation. The comparison design must evaluate those assumptions.

Respond to adverse results

Check transcription, units, methods, reference assignment, item condition and genuine technical failure. Do not dismiss an adverse outcome solely because routine clients have not complained. Contain the relevant activity, review prior outputs and verify corrective effectiveness with a meaningful challenge before restoring confidence.

TM07 Inspection, auditing and professional judgment

Make judgment inspectable

Define the criteria, defect classes, permitted discretion and required evidence. Use reference cases and observed performance to calibrate inspectors and auditors. Two competent people should be able to understand why the same evidence led to a conclusion, even where professional judgment is unavoidable.

Record what was examined and what could not be accessed. Trace an inspection result to the specific vehicle or installation and time. Trace an audit finding to a process, site, shift, record or interview and the criterion breached. Keep improvement suggestions separate from nonconformities.

Sampling and remote limitations

Choose cases across risk, shifts, locations and adverse history. Explain that an audit sample is not a guarantee about every transaction. Where remote observation is used, verify identity and location, retain original-source access and identify camera blind spots, outages and client-controlled selection.

Use physical follow-up when remote evidence cannot establish equipment condition, actual execution or independence. For ongoing surveillance, missed observations and broken custody require explicit treatment; they cannot disappear into an otherwise positive report.

Review and follow-up

A competent reviewer evaluates evidence sufficiency, relationship disclosure, severity and limitations. For safety-critical or novel work, review is independent of the performer. Follow-up verifies effective correction, not only a promise or a photograph. An AUD report remains an audit report unless a separately approved certification scheme and decision apply.

TM08 Certification evaluation and continuing assurance

Management systems

Plan a readiness assessment followed by implementation evaluation. Determine effort from size, complexity, locations, shifts, outsourcing and risk. Record why time and sampling are sufficient. Evaluate internal audit, management review, actual process control and corrective effectiveness. Do not certify from documents alone.

Keep the client certification cycle separate from the body accreditation cycle. MSC client certification lasts no more than three years with at least annual surveillance; ACC body approval lasts no more than four years. Multi-site sampling needs demonstrable common control and comparable operations; unique high-risk activities require direct coverage.

Products, processes and services

A certification scheme defines selection, evaluation, review, decision, surveillance, duration and mark use. Separate batch-only, type and continuing-production claims. Justify representative and worst-case variants, evaluate supporting laboratories and inspect production controls when continuing output is certified.

Require notification and evaluation of material changes to design, software, suppliers, materials and sites. A product certification decision is not automatically extended by a laboratory report on one altered sample. Maintain a controlled scope and visible status for each certificate.

Independent decisions

Certification decisions remain the responsibility of the body and cannot be outsourced. Decision-makers must not have participated in evaluation. Close all initial-certification nonconformities before grant under the CAAR categories. For ongoing certificates, follow the documented scheme, apply necessary protection and keep suspension, restoration and expiry history.

TM09 Personnel competence assessment

Start from the occupational role

Analyze tasks, responsibilities, hazards, knowledge, practical skills and judgment. Build a competence blueprint and identify mandatory safety gates. Consult employers, practitioners and other relevant users without letting one commercial training provider control the scheme.

Define prerequisites, assessment methods, evidence, pass rules, limitations and recertification. A credential should describe demonstrated competence, not promise a statutory license or competence in every automotive task.

Assess the individual

Verify identity and authentic performance. Use observed practical tasks for hands-on claims and include safe response to abnormal conditions. Simulation may be suitable where it reproduces the relevant competence safely; explain what it does not demonstrate. Do not create a dangerous live failure merely to test reaction.

Control examination security, examiner consistency and reasonable accommodations. A trainer may contribute evidence but cannot be the sole assessor of their own learner. An independent decision-maker confirms every mandatory competence and safety gate; aggregate scores cannot compensate for unsafe performance.

Maintain confidence

Use a term no longer than three years and require evidence of continued practice and competence for recertification. Investigate credible loss of competence, misuse and incidents. Preserve due process, personal data and a public verification response proportionate to the credential.

TM10 Claims, validation and verification

Define the assertion

Record the claim, responsible party, period, boundary, criteria, assurance level, materiality and intended users. Verification addresses historical or existing facts; validation addresses support for a prospective proposition. Neither should be represented as a guarantee of future performance.

Plan evidence from risk analysis of data sources, control weaknesses, estimation, boundary choices and potential incentives to misstate. A broad environmental claim may require examination of omissions and lifecycle trade-offs, not only recalculation of a supplied spreadsheet.

Materiality and evidence

Set both quantitative and qualitative materiality. A small numerical error can be material when it changes a safety conclusion, conceals prohibited behavior or reverses the intended user decision. Aggregate related errors and evaluate systematic bias.

Trace samples to original records, assess data completeness and recalculate important transformations. Evaluate estimates and uncertainty, model assumptions and double counting. Limited assurance changes the planned nature and extent of evidence; it does not permit a known material misstatement to be ignored.

Conclusion and later facts

An independent competent reviewer checks whether the conclusion fits the evidence and whether exclusions are visible. Qualify or withhold a conclusion where necessary. Preserve the exact assessed claim version. If later facts materially undermine it, review impact, correct the statement and notify known users through the controlled status process.

TM11 Digital evidence, automation and model credibility

Evidence architecture

Use unique identities for jobs, configurations, datasets, software and outputs. Retain original data, transformations, tool versions, permissions and timestamps with a reliable time basis. Test transfer completeness and reject duplicate, truncated or mismatched inputs.

Validate calculation tools and interfaces with known cases, boundary values, invalid inputs and recovery scenarios. A protected spreadsheet can still contain a wrong formula. Review changes independently and retain test evidence.

Models and artificial intelligence

Describe intended use, training/reference data, operating domain, validation datasets, failure modes and accountable humans. Check leakage, bias, drift, adversarial behavior and unsupported generated content as relevant. AI may assist analysis but shall not be the sole basis of accreditation, certification or a disputed adverse decision.

For virtual testing, establish correlation with physical behavior and quantify important discrepancy. Track versions and parameter changes and identify where the model is extrapolating. A digital twin label does not by itself establish a credible model.

Security and recovery

Use least-privilege access, individual accounts, strong authentication and monitored change logs. Protect signing keys and revoke compromised credentials. Test backup restoration and verify record integrity after recovery. A broken verification service must return unavailable or unresolved, not an invented current approval.

TM12 IAF file sampling and witness coverage

Define strata before selecting files

Use a separate stratum for each category, site and justified technical family, based on the previous twelve months completed work. Reconcile the population with job, report and certificate registers. Include abandoned, failed, amended and outsourced cases in the appropriate risk review.

If $N \leq 5$, review all case files. Otherwise review at least $\max(5, \text{ceiling}(\text{square root of } N))$.

Examples: $N = 3$ requires 3 files; $N = 16$ requires 5; $N = 64$ requires 8; $N = 121$ requires 11. Two separate strata of 16 and 64 require $5 + 8 = 13$ files, not the pooled sample of 9 for $N = 80$.

Coverage beyond the numerical floor

Add complaints, borderline decisions, failures, major amendments, external work and high-consequence cases even if the minimum is already reached. The sample formula is not a statistical confidence claim. Expand whenever inconsistencies or systemic failure appear.

For ACC, at least three complete executed cases and one end-to-end witnessed activity per family/site are readiness requirements. Reviewing all two available files does not satisfy the three-case minimum. Certification categories require real completed client or candidate cases. Every initial critical permanent location receives physical assessment.

Witness record

Record scope row, family, date, location, personnel, configuration, actual steps, original records, checks, anomalies, questions and conclusion. Trace both technical execution and review/release. Witnessing one easy method cannot support materially different unobserved hazards. REC requires review of every enumerated output and material project stage.

TM13 Proficiency programmes and reference materials

Comparison providers

Define the competence question and statistical design before distributing items. Demonstrate homogeneity and stability, establish credible assigned values and uncertainty, protect participant confidentiality and evaluate the effect of method differences. Pilot unfamiliar designs.

Predetermine scoring, exclusions and handling of compromised items. Do not adjust acceptance thresholds after seeing results to satisfy participants. A participant dispute requires independent investigation and correction of affected reports when the provider is wrong.

Reference materials and artifacts

Control source, preparation, batch identity, characterization, homogeneity, stability and distribution. Establish minimum sample intake and intended-use limits. Include relevant uncertainty contributions and distinguish certified from indicative properties.

Certificates should state property values, units, uncertainty and coverage where appropriate, traceability, storage, handling, validity and restrictions. For reference datasets explain provenance, labeling, permissible use and validation limitations; do not assume a digital file has no stability or versioning risk.

Post-distribution responsibility

Maintain monitoring and a reachable correction process. When assigned values or material stability fail, identify affected users and provide technically useful notice. Evaluate impacts on laboratories and decisions that relied on the material or comparison. Preserve original and corrected information.

TM14 Technical closure and defensible restoration

Contain first, then investigate

Define the affected activity and prevent unreliable release. Preserve evidence and identify the earliest potentially affected date. Check whether the cause extends across shared equipment, software, staff, sites or schemes. Do not confine a systemic problem to the case that happened to reveal it.

Distinguish immediate correction from root-cause action. Replacing a broken sensor may correct the current job; interval review, drift detection and impact analysis address recurrence and prior results.

Demonstrate effectiveness

Choose a challenge capable of revealing the original failure mode. Use independent review, repeat work, blind items, additional witnesses or a revisit where needed. Define acceptance before evaluating the corrective evidence. Verify that new controls operate under normal workload, not only during a special demonstration.

Initial approval waits until all applicable findings are Met. On active ACC, the ninety-day Minor allowance is limited to isolated lapses without compromised validity, safety or impartiality. Major findings require immediate containment and a thirty-day target; Critical findings need immediate protective review.

Restore with an audit trail

An independent authorized decision records restored scope and effective date. Do not backdate a gap. Update verification status, inform affected users and preserve the relationship between original, corrected and withdrawn outputs. Where evidence remains uncertain, keep the relevant restriction and explain what remains unresolved.